vacation. It is hoped that chemical analyses of these samples will throw some light on the subject.

The following references to the literature may be useful to those who wish to read what has been written regarding these mounds on the Pacific coast: Le Conte, *Proceedings California Academy of Sciences,* V., 219 (1873); *Nature,* April 19, 1877, XV., 530; Wallace, *Nature,* XV., 274; Barnes, *American Naturalist,* September, 1879, XIII., 565; Turner, 17th annual report U. S. G. S., Part I., 681. To these may be added Walther's 'Denudation in der Wüste,' 377, 390. The paper by Mr. Turner contains a good picture of the mounds on the foot-hills near Snelling, California.

J. C. Branner.

Stanford University,
March 3, 1905.

NOTES ON THE HISTORY OF NATURAL SCIENCE.

OPPIAN ON FISHING.

An early work on angling, dating from the second century of our era, and possessing considerable scientific as well as literary merit, is the 'Halieutica,' in five books, by Oppian of Cilicia. Unlike most ancient writers on natural history, Oppian manifests a strict regard for truth, not only avoiding fabulous tales, but often refuting popular errors. To wide and accurate observation the author adds the charm of felicitous description, his treatment of the subject-matter being unusually graceful and animated. Concerning modes of fishing and diving, habits of marine animals and general natural history, there is much of interest to modern readers, and in former times the work was held in high esteem. Appended to the English translation, published in 1722, is a catalogue of the vernacular names of fishes mentioned by Oppian, with their common English equivalents—the latter, however, not being always accurately given. A revised *Nomenclator* of classical names of animals, with synonyms and etymology, would be gladly welcomed by modern systematists.

ROMAN ICHTHYOLOGY.

Amongst early works of interest to ichthyologists, noticed more or less fully by Cuvier in his 'History of Natural Sciences,' there are two or three Roman writings which contain numerous and valuable observations on aquatic animals. These appeal with equal force to naturalists and classicists of our own day, though the latter appear to be on more familiar terms with them.

One of these works well worthy of attention is the '*Halieutica*' of Ovid, or commonly attributed to him, a poem which has come down to us in only one third of its entirety. Names are given in this fragment of fifty-three species of fishes, most of which are tolerably well indicated by the descriptions. Cuvier remarks that but for this poem of Ovid, a number of passages in Pliny would be unintelligible to modern readers; and in the copy belonging to the Harvard Museum, formerly the property of Louis Agassiz, occurs a manuscript note by the latter, referring to Ovid's comment on fossil shells and description of man in his '*Metamorphoses.*'

Another work regarded by Cuvier as 'extremely precious for natural history' is that bearing the assumed name of the gourmand Apicius, the ninth and tenth books being especially fruitful in information. Various ichthyological notices are contained in the agricultural works ('*De re rustica*') of Columella, Varro and Cato. Apuleius is credited with having made refined anatomical dissections, and Athenæus gives descriptions of eighty-four species of fishes, arranged in alphabetical order. It may not be generally known that Cuvier himself assisted in the recension of the text of Ælian's 'History of Animals,' his collaborators being the well-known French translators of Pliny.

SUBTERRANEAN FISHES.

Lasaulx, in his 'Geology of the Greeks and Romans,' and Sir Charles Lyell, in the introductory chapter of his 'Principles of Geology,' are responsible for widespread misconception of Aristotelian views in regard to the nature and origin of fossils. Certain passages in the

works of the great Stagyrite and his successor Theophrastus, are interpreted by these authors, and in their wake by students generally, as applying to ichthyic remains found in stratified rock, whereas the original texts speak only of living fishes which burrow in the mud, and are able to survive for a considerable time out of water. Thus the passages were understood by ancient commentators, and the idea that they refer to things fossil has clearly been 'read into' them by modern historians.

Lyell's statement of the matter is as follows, omitting criticisms:

> Aristotle, in his treatise on respiration, speaks distinctly of fossil fishes; and his pupil, Theophrastus, alluding to such fishes found near Heraclea, in Pontus, and in Paphlagonia, says that they were either procreated from fish-spawn left behind in the earth, or had gone astray from rivers or from the sea, for the sake of food, into cavities of the earth, where they had become petrified.

Nothing could more completely miss the sense of the original than the above paragraph. The title of Theophrastus's essay, 'On Fishes that Exist out of Water,' is alone sufficient to exclude the notion of petrified remains. Besides, we have both ancient and modern confirmation of the accounts relative to the taking of 'dug mullets' and loaches in the same localities. Pomponius Mela, it is true, rejects the reports as improbable fish stories, but Strabo, Pliny, Polybius and others corroborate them at all points; and in our own time the facts have been verified *de novo*.

What Pliny says on this matter is interesting. He mentions a kind of loach, which Cuvier thinks is identifiable with the *Cobitis fossilis* of Linnæus, and observes that it 'frequents the waters near the banks of the rivers and makes holes for itself, in which it lives, even when the water retires and the bed of the river is dry; for which reason these fishes have to be dug out of the ground, and only show by the movement of the body that they are still alive.' Nor does he omit in the same connection ('Nat. Hist.,' IX., 83) to quote Theophrastus's statement that 'in Paphlagonia, also, land fishes are dug up which are most excellent eating.'

Strabo is equally explicit in his account of the 'dug mullets' of Narbonne, long esteemed one of the principal wonders of the Keltic coast. Thus we read in the fourth book of his 'Geography' as follows:

> There is a lake near to Ruscino [on the site of which now stands Perpignan], and a little above the sea a marshy district full of salt-springs, which supplies 'dug mullets'; for whoever digs two or three feet, and plunges a trident into the muddy water, will be sure to take the fish, which are noteworthy for their considerable size; they are nourished in the mud like eels.

It is unnecessary to prolong the discussion, or to point out that the views of ancient masters in natural science have been needlessly disparaged through faulty interpretation of the original sources. We are concerned only with restoring to the latter their literal meaning. A word may be said, however, concerning the formidable array of geological doctrines attributed by Lyell, in the work quoted, to Pythagoras, of the sixth century, B. C. Of this almost mythical personage we know very little for certain, of his doctrines nothing at all. Those ascribed to him are not Pythagorean, but Stoic; not of the hoary sixth century before our era, but Augustan; not altogether Greek, but in large part Roman; and in order to form a clear historical perspective it is necessary that these facts be recognized.

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SCIENTIFIC NOTES AND NEWS.

THE Central Branch of the American Society of Naturalists and affiliated societies are holding their third annual meeting at Chicago from March 31 to April 1. Professor John M. Coulter, chairman of the Central Branch, will deliver the annual address at the dinner on March 31. Special programs have been arranged for the zoologists, botanists, anatomists and physiologists. We hope to print abstracts of the papers, a considerable number of which are announced on the preliminary program.

IT is announced that the first John Fritz gold medal will be conferred upon Lord Kelvin. This medal is awarded by a joint committee of the American Institute of Electrical